



1

SEQUENCE LISTING

<110> GUERIN-MARCHAND, CLAUDINE
DRUILHE, PIERRE

<120> PEPTIDE SEQUENCES SPECIFIC FOR THE HEPATIC STAGES OF P. FALCIPARUM
BEARING EPITOPES CAPABLE OF STIMULATING THE T LYMPHOCYTES

<130> 010830-118

<140> 09/900,963

<141> 2001-07-10

<150> 08/098,327

<151> 1993-11-24

<150> PCT/FR92/00104

<151> 1992-02-05

<150> FR 91 01286

<151> 1991-02-05

<160> 47

<170> PatentIn Ver. 3.3

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<400> 1

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1

5

10

15

Arg

<210> 2

<211> 17

<212> PRT

<213> Artificial Sequence

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<220>
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 Gln

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<220>
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<220>
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<400> 6
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<400> 7
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 Lys

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 Asp

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 1 5 10 15
 Xaa

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<211> 107

<212> PRT

<213> Plasmodium falciparum

<400> 19

Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg Lys Lys Glu His Gly
 1 5 10 15

Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu Glu Ile Pro Ala Ile
 20 25 30

Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr Ile Pro His Gln Ser
 35 40 45

Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg Asp Ser Lys Glu Ile
 50 55 60

Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile Thr Thr Asn Val Glu
 65 70 75 80

Gly Arg Arg Asp Ile His Lys Gly His Leu Glu Glu Lys Lys Asp Gly
 85 90 95

Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
 100 105

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<211> 117

<212> PRT

<213> Plasmodium falciparum

<400> 20

Leu Gln Glu Gln Gln Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys
 1 5 10 15

Lys Asn Leu Glu Arg Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp
 20 25 30

Leu Tyr Gly Arg Leu Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn
 35 40 45

Glu Arg Gly Tyr Tyr Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn
 50 55 60

Arg Gly Asn Ser Arg Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr
 65 70 75 80

Asn Arg Glu Ser Ile Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His
 85 90 95

Lys Gly His Leu Glu Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln
 100 105 110

Lys Glu Asp Lys Ser
 115

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<211> 27

<212> PRT

<213> Plasmodium falciparum

<400> 21

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Ala	Glu	Asp	Leu	Tyr	Gly	Arg	Leu	Glu	Ile	Pro
			20					25		

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<211> 24

<212> PRT

<213> Plasmodium falciparum

<400> 22

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Gln	Arg	Lys	Ala	Asp	Thr	Lys	Lys
							20

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<211> 31

<212> PRT

<213> Plasmodium falciparum

<400> 23

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Glu	Ser	Ile	Thr	Thr	Asn	Val	Glu	Gly	Arg	Arg	Asp	Ile	His	Lys
					20			25					30	

<210> 24

<211> 151

<212> PRT

<213> Plasmodium falciparum

<400> 24

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Glu	Val	Lys	Glu	Asn	Ile	Leu	Glu	Glu	Ser	Gln	Val	Asn	Glu	Asp	Ile
				20				25					30		

Phe	Asn	Ser	Leu	Val	Lys	Ser	Val	Gln	Gln	Glu	Gln	Gln	His	Asn	Val
			35				40					45			

Glu	Glu	Lys	Val	Glu	Glu	Ser	Val	Glu	Glu	Asn	Asp	Glu	Glu	Ser	Val
			50				55				60				

14

Glu Glu Asn Val Glu Glu Asn Val Glu Glu Asn Asp Asp Gly Ser Val
65 70 75 80
Ala Ser Ser Val Glu Glu Ser Ile Ala Ser Ser Val Asp Glu Ser Ile
85 90 95
Asp Ser Ser Ile Glu Glu Asn Val Ala Pro Thr Val Glu Glu Ile Val
100 105 110
Ala Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Lys Cys
115 120 125
Ala Pro Ser Val Glu Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val
130 135 140
Ala Glu Met Leu Lys Glu Arg
145 150

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1 5 10 15
Glu Val Lys Glu Asn Ile Leu Glu Glu Ser Gln Val Asn Asp Asp Ile
20 25 30
Phe Asn Ser Leu Val Lys Ser Val Gln Gln Glu Gln Gln His Asn
35 40 45

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1 5 10 15
Val Lys Glu Asn Ile Leu Glu Glu Ser Gln
20 25

<210> 27
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<213> Plasmodium falciparum

<400> 27
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1 5 10 15

15

Lys Ser Val Gln Gln Glu Gln Gln His Asn Val
20 25

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<212> PRT

<213> Plasmodium falciparum

<400> 28

Val Glu Lys Cys Ala Pro Ser Val Glu Glu Ser Val Ala Pro Ser Val
1 5 10 15

Glu Glu Ser Val Ala Glu Met Leu Lys Glu Arg
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<210> 29

<211> 17

<212> DNA

<213> Artificial Sequence

<220>

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17

<210> 30

<211> 15

<212> DNA

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<220>

<223> Description of Artificial Sequence: Synthetic Primer

<400> 30

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15

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<211> 316

<212> PRT

<213> Plasmodium falciparum

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1 5 10 15

Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu Lys Leu Gln Glu
20 25 30

Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln
35 40 45

Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu
50 55 60

Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 65 70 75 80
 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
 85 90 95
 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys
 100 105 110
 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 115 120 125
 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu
 130 135 140
 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg
 145 150 155 160
 Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 165 170 175
 Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln
 180 185 190
 Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Arg Asp Leu Glu
 195 200 205
 Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg Lys Lys Glu His
 210 215 220
 Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu Glu Ile Pro Ala
 225 230 235 240
 Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr Ile Pro His Gln
 245 250 255
 Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg Asp Ser Lys Glu
 260 265 270
 Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile Thr Thr Asn Val
 275 280 285
 Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu Glu Lys Lys Asp
 290 295 300
 Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
 305 310 315

<210> 32

<211> 950

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 agagacttgc taaagaaaag ttgcaagaac aacaaagcga tctagaacaa gagagacgtg 180


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ctaaagaaaa gttgcaagaa caacaaagcg atttagaaca agagagacgt gctaaagaaa 240
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gacgtgctaa agaaaagttg caagaacaac aaagcgattt agaacaagag agacgtgcta 540
aagaaaagtt gcaagaacaa caaagcgatt tagaacaaga gagacgtgct aaagaaaagt 600
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gaaaaaagga acatggagat atattagcag aggatttata tggtcgttta gaaataccag 720
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ctcaggacaa cagagggaa agtagagatt ccaaggaaat atctataata gaaaaacaa 840
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<212> DNA

<213> Plasmodium falciparum

<400> 34

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aaaaagatga aatcataaaa tctaacttga gaagtgggtc ttcaaattct aggaatcgaa 180
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 Leu Ile Phe His Ile Asn Gly Lys Ile Ile Lys Asn Ser Glu Lys Asp
 20 25 30

 gaa atc ata aaa tct aac ttg aga agt ggt tct tca aat tct agg aat 144
 Glu Ile Ile Lys Ser Asn Leu Arg Ser Gly Ser Ser Asn Ser Arg Asn
 35 40 45

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 Arg Ile Asn Glu Glu Asn His Glu Lys Lys His Val Leu Ser His Asn
 50 55 60

 tca tat gag aaa act aaa aat aat gaa aat aat aaa ttt ttc gat aag 240
 Ser Tyr Glu Lys Thr Lys Asn Asn Glu Asn Asn Lys Phe Phe Asp Lys
 65 70 75 80

 gat aaa gag tta acg atg tct aat gta aaa aat gtg tca caa aca aat 288
 Asp Lys Glu Leu Thr Met Ser Asn Val Lys Asn Val Ser Gln Thr Asn
 85 90 95

 ttc aaa agt ctt tta aga aat ctt ggt gtt tca gag aat ata ttc ctt 336
 Phe Lys Ser Leu Leu Arg Asn Leu Gly Val Ser Glu Asn Ile Phe Leu
 100 105 110

 aaa gaa aat aaa tta aat aag gaa ggg aaa tta att gaa cac ata ata 384
 Lys Glu Asn Lys Leu Asn Lys Glu Gly Lys Leu Ile Glu His Ile Ile
 115 120 125

 aat gat gat gac gat aaa aaa aaa tat att aaa ggg caa gac gaa aac 432
 Asn Asp Asp Asp Asp Lys Lys Lys Tyr Ile Lys Gly Gln Asp Glu Asn
 130 135 140

aga	caa	gaa	gat	ctt	gaa	gaa	aaa	gca	gct	aaa	gaa	aag	tta	cag	ggg	480
Arg	Gln	Glu	Asp	Leu	Glu	Glu	Lys	Ala	Ala	Lys	Glu	Lys	Leu	Gln	Gly	
145					150					155					160	
caa	caa	agc	gat	tca	gaa	caa	gag	aga	cgt	gct	aaa	gaa	aag	ttg	caa	528
Gln	Gln	Ser	Asp	Ser	Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	
				165					170						175	
gaa	caa	caa	agc	gat	tta	gaa	caa	gag	aga	ctt	gct	aaa	gaa	aag	ttg	576
Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Leu	Ala	Lys	Glu	Lys	Leu	
			180					185						190		
caa	gaa	caa	caa	agc	gat	tta	gaa	caa	gag	aga	cgt	gct	aaa	gaa	aag	624
Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	
		195					200					205				
ttg	caa	gaa	caa	caa	agc	gat	tta	gaa	caa	gag	aga	ctt	gct	aaa	gaa	672
Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Leu	Ala	Lys	Glu	
	210						215				220					
aag	ttg	caa	gaa	caa	caa	agc	gat	tta	gaa	caa	gag	aga	cgt	gct	aaa	720
Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Arg	Ala	Lys	
225					230					235					240	
gaa	aag	ttg	caa	gaa	caa	caa	agc	gat	tta	gaa	caa	gag	aga	cgt	gct	768
Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Arg	Ala	
			245					250						255		
aaa	gaa	aag	ttg	caa	gaa	caa	caa	agc	gat	tta	gaa	caa	gag	aga	ctt	816
Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Leu	
			260					265					270			
gct	aaa	gaa	aag	tta	caa	gag	cag	caa	agc	gat	tta	gaa	caa	gat	aga	864
Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Asp	Arg	
		275					280					285				
ctt	gct	aaa	gaa	aag	ttg	caa	gaa	caa	caa	agc	gat	tta	gaa	caa	gag	912
Leu	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	
	290					295					300					
aga	cgt	gct	aaa	gaa	agg	ttg	caa	gaa	caa	caa	agc	gat	tta			954
Arg	Arg	Ala	Lys	Glu	Arg	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu			
305					310					315						

<210> 38

<211> 318

<212> PRT

<213> Plasmodium falciparum

<400> 38

Met	Lys	His	Ile	Leu	Tyr	Ile	Ser	Phe	Tyr	Phe	Ile	Leu	Val	Asn	Leu
1				5					10					15	

Leu	Ile	Phe	His	Ile	Asn	Gly	Lys	Ile	Ile	Lys	Asn	Ser	Glu	Lys	Asp
			20					25					30		

Glu Ile Ile Lys Ser Asn Leu Arg Ser Gly Ser Ser Asn Ser Arg Asn
 35 40 45
 Arg Ile Asn Glu Glu Asn His Glu Lys Lys His Val Leu Ser His Asn
 50 55 60
 Ser Tyr Glu Lys Thr Lys Asn Asn Glu Asn Asn Lys Phe Phe Asp Lys
 65 70 75 80
 Asp Lys Glu Leu Thr Met Ser Asn Val Lys Asn Val Ser Gln Thr Asn
 85 90 95
 Phe Lys Ser Leu Leu Arg Asn Leu Gly Val Ser Glu Asn Ile Phe Leu
 100 105 110
 Lys Glu Asn Lys Leu Asn Lys Glu Gly Lys Leu Ile Glu His Ile Ile
 115 120 125
 Asn Asp Asp Asp Asp Lys Lys Lys Tyr Ile Lys Gly Gln Asp Glu Asn
 130 135 140
 Arg Gln Glu Asp Leu Glu Glu Lys Ala Ala Lys Glu Lys Leu Gln Gly
 145 150 155 160
 Gln Gln Ser Asp Ser Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln
 165 170 175
 Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu Lys Leu
 180 185 190
 Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 195 200 205
 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu
 210 215 220
 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys
 225 230 235 240
 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 245 250 255
 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu
 260 265 270
 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
 275 280 285
 Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 290 295 300
 Arg Arg Ala Lys Glu Arg Leu Gln Glu Gln Gln Ser Asp Leu
 305 310 315

<210> 39
 <211> 1493
 <212> DNA
 <213> Plasmodium falciparum

<400> 39
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 caaagcgatt tagaacaaga tagacttgct aaagaaaagt tacaagagca gcaaagcgat 120
 ttagaacaag agagacttgc taagaaaagt tgcaagaaca acaaagcgat ctagaacaag 180
 agagacgtgc taaagaaaag ttgcaagaac acaaaagcga tttagaacaa gagagacgtg 240
 ctaaagaaaa gttgcaagaa caacaaagcg atttagaaca agatagactt gctaaagaaa 300
 agttacaaga gcagcaaaagc gatttagaac aagagagacg tgctaaagaa aagttgcaag 360
 aacaacaaag cgatttagaa caagagagac gtgctaagaa aagttgcaag aacaacaaag 420
 cgatttagaa caagagagac ttgctaaaga aaagttgcaa gaacaacaaa gcgatttaga 480
 acaagagaga cgtgctaaag aaaagttgca agaacaacaa agcgatttag aacaagagag 540
 acgtgctaag aaaagttgca agaacaacaa agcgatttag aacaagagag acgtgctaaa 600
 gaaaagttgc aagagcagca aagagattta gaacaaagga aggctgatac gaaaaaaaat 660
 ttagaaagaa aaaaggaaca tggagatata ttagcagagg atttatatgg tcgtttagaa 720
 ataccagcta tagaacttcc atcagaaaat gaacgtggat attatatacc acatcaatct 780
 tctttacctc aggacaacag agggaaatag agagattcca aggaaatatc tataatagaa 840
 aaaaacaaata gagaatctat tacaacaaat gttgaaggac gaagggatat acataaagga 900
 catcttgaag aaaagaaaga tggttcaata aaaccagaac aaaaagaaga taaatctgct 960
 gacatacaaa atcatacatt agagacagta aatatttctg atgttaatga ttttcaata 1020
 agtaagtatg aggatgaaat aagtgctgaa tatgacgatt cattaataga tgaagaagaa 1080
 gatgatgaag acttagacga atttaagcct attgtgcaat atgacaattt ccaagatgaa 1140
 gaaaacatag gaatttataa agaactagaa gatttgatag agaaaaatga aaatttagat 1200
 gatttagatg aaggaataga aaaatcatca gaagaattat ctgaagaaaa aataaaaaaa 1260
 ggaaagaaat atgaaaaaac aaaggataat aattttaaac caaatgataa aagtttgtat 1320
 gatgagcata ttaaaaaata taaaaatgat aagcaggtta ataaggaaaa ggaaaaattc 1380
 ataaaatcat tgtttcatat atttgacgga gacaatgaaa ttttacagat cgtggatgag 1440
 ttatctgaag atataactaa atattttatg aaactataaa aggttatata ttt 1493

<210> 40
 <211> 12
 <212> DNA
 <213> Plasmodium falciparum

<400> 40
 caagaacaac aa 12

<210> 41
 <211> 12
 <212> DNA
 <213> Plasmodium falciparum

<400> 41
 gggttatatat tt 12

<210> 42
 <211> 1494
 <212> DNA
 <213> Plasmodium falciparum

<221> CDS
 <222> (1)..(1494)

<400> 42

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Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys	
1 5 10 15	
ttg caa gaa caa caa agc gat tta gaa caa gat aga ctt gct aaa gaa	96
Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu	
20 25 30	
aag tta caa gag cag caa agc gat tta gaa caa gag aga ctt gct aaa	144
Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys	
35 40 45	
gaa aag ttg caa gaa caa caa agc gat cta gaa caa gag aga cgt gct	192
Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala	
50 55 60	
aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag aga cgt	240
Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg	
65 70 75 80	
gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gat aga	288
Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg	
85 90 95	
ctt gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gag	336
Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu	
100 105 110	
aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa	384
Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln	
115 120 125	
gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa	432
Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu	
130 135 140	
caa gag aga ctt gct aaa gaa aag ttg caa gaa caa caa agc gat tta	480
Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu	
145 150 155 160	
gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat	528
Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp	
165 170 175	
tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc	576
Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser	
180 185 190	
gat tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gag cag caa	624
Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln	
195 200 205	
aga gat tta gaa caa agg aag gct gat acg aaa aaa aat tta gaa aga	672
Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg	
210 215 220	

aaa aag gaa cat gga gat ata tta gca gag gat tta tat ggt cgt tta	720
Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu	
225 230 235 240	
gaa ata cca gct ata gaa ctt cca tca gaa aat gaa cgt gga tat tat	768
Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr	
245 250 255	
ata cca cat caa tct tct tta cct cag gac aac aga ggg aat agt aga	816
Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg	
260 265 270	
gat tcc aag gaa ata tct ata ata gaa aaa aca aat aga gaa tct att	864
Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile	
275 280 285	
aca aca aat gtt gaa gga cga agg gat ata cat aaa gga cat ctt gaa	912
Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu	
290 295 300	
gaa aag aaa gat ggt tca ata aaa cca gaa caa aaa gaa gat aaa tct	960
Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser	
305 310 315 320	
gct gac ata caa aat cat aca tta gag aca gta aat att tct gat gtt	1008
Ala Asp Ile Gln Asn His Thr Leu Glu Thr Val Asn Ile Ser Asp Val	
325 330 335	
aat gat ttt caa ata agt aag tat gag gat gaa ata agt gct gaa tat	1056
Asn Asp Phe Gln Ile Ser Lys Tyr Glu Asp Glu Ile Ser Ala Glu Tyr	
340 345 350	
gac gat tca tta ata gat gaa gaa gaa gat gat gaa gac tta gac gaa	1104
Asp Asp Ser Leu Ile Asp Glu Glu Glu Asp Asp Glu Asp Leu Asp Glu	
355 360 365	
ttt aag cct att gtg caa tat gac aat ttc caa gat gaa gaa aac ata	1152
Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile	
370 375 380	
gga att tat aaa gaa cta gaa gat ttg ata gag aaa aat gaa aat tta	1200
Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu	
385 390 395 400	
gat gat tta gat gaa gga ata gaa aaa tca tca gaa gaa tta tct gaa	1248
Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu	
405 410 415	
gaa aaa ata aaa aaa gga aag aaa tat gaa aaa aca aag gat aat aat	1296
Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn	
420 425 430	
ttt aaa cca aat gat aaa agt ttg tat gat gag cat att aaa aaa tat	1344
Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr	
435 440 445	

aaa aat gat aag cag gtt aat aag gaa aag gaa aaa ttc ata aaa tca 1392
 Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
 450 455 460

 ttg ttt cat ata ttt gac gga gac aat gaa att tta cag atc gtg gat 1440
 Leu Phe His Ile Phe Asp Gly Asp Asn Glu Ile Leu Gln Ile Val Asp
 465 470 475 480

 gag tta tct gaa gat ata act aaa tat ttt atg aaa cta taa aag gtt 1488
 Glu Leu Ser Glu Asp Ile Thr Lys Tyr Phe Met Lys Leu
 485 490

 ata tat 1494

<210> 43

<211> 493

<212> PRT

<213> Plasmodium falciparum

<400> 43

Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 1 5 10 15

 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
 20 25 30

 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys
 35 40 45

 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 50 55 60

 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg
 65 70 75 80

 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
 85 90 95

 Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 100 105 110

 Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln
 115 120 125

 Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu
 130 135 140

 Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu
 145 150 155 160

 Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp
 165 170 175

 Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser
 180 185 190

Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln
 195 200 205
 Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg
 210 215 220
 Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu
 225 230 235 240
 Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr
 245 250 255
 Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg
 260 265 270
 Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile
 275 280 285
 Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu
 290 295 300
 Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
 305 310 315 320
 Ala Asp Ile Gln Asn His Thr Leu Glu Thr Val Asn Ile Ser Asp Val
 325 330 335
 Asn Asp Phe Gln Ile Ser Lys Tyr Glu Asp Glu Ile Ser Ala Glu Tyr
 340 345 350
 Asp Asp Ser Leu Ile Asp Glu Glu Glu Asp Asp Glu Asp Leu Asp Glu
 355 360 365
 Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile
 370 375 380
 Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu
 385 390 395 400
 Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu
 405 410 415
 Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn
 420 425 430
 Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr
 435 440 445
 Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
 450 455 460
 Leu Phe His Ile Phe Asp Gly Asp Asn Glu Ile Leu Gln Ile Val Asp
 465 470 475 480
 Glu Leu Ser Glu Asp Ile Thr Lys Tyr Phe Met Lys Leu
 485 490

<210> 44
 <211> 12
 <212> DNA
 <213> Plasmodium falciparum

<400> 44
 caagaacaac aa 12

<210> 45
 <211> 12
 <212> DNA
 <213> Plasmodium falciparum

<400> 45
 atgaaactat aa 12

<210> 46
 <211> 1494
 <212> DNA
 <213> Plasmodium falciparum

<221> CDS
 <222> (1)..(1494)

<400> 46
 caa gaa caa caa agc gat cta gaa caa gag aga cgt gct aaa gaa aag 48
 Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 1 5 10 15

ttg caa gaa caa caa agc gat tta gaa caa gat aga ctt gct aaa gaa 96
 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
 20 25 30

aag tta caa gag cag caa agc gat tta gaa caa gag aga ctt gct aaa 144
 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys
 35 40 45

gaa aag ttg caa gaa caa caa agc gat cta gaa caa gag aga cgt gct 192
 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 50 55 60

aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag aga cgt 240
 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg
 65 70 75 80

gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gat aga 288
 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
 85 90 95

ctt gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gag 336
 Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 100 105 110

aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa 384
 Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln
 115 120 125

gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa	432
Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu	
130 135 140	
caa gag aga ctt gct aaa gaa aag ttg caa gaa caa caa agc gat tta	480
Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu	
145 150 155 160	
gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat	528
Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp	
165 170 175	
tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc	576
Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser	
180 185 190	
gat tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gag cag caa	624
Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln	
195 200 205	
aga gat tta gaa caa agg aag gct gat acg aaa aaa aat tta gaa aga	672
Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg	
210 215 220	
aaa aag gaa cat gga gat ata tta gca gag gat tta tat ggt cgt tta	720
Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu	
225 230 235 240	
gaa ata cca gct ata gaa ctt cca tca gaa aat gaa cgt gga tat tat	768
Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr	
245 250 255	
ata cca cat caa tct tct tta cct cag gac aac aga ggg aat agt aga	816
Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg	
260 265 270	
gat tcc aag gaa ata tct ata ata gaa aaa aca aat aga gaa tct att	864
Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile	
275 280 285	
aca aca aat gtt gaa gga cga agg gat ata cat aaa gga cat ctt gaa	912
Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu	
290 295 300	
gaa aag aaa gat ggt tca ata aaa cca gaa caa aaa gaa gat aaa tct	960
Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser	
305 310 315 320	
gct gac ata caa aat cat aca tta gag aca gta aat att tct gat gtt	1008
Ala Asp Ile Gln Asn His Thr Leu Glu Thr Val Asn Ile Ser Asp Val	
325 330 335	
aat gat ttt caa ata agt aag tat gag gat gaa ata agt gct gaa tat	1056
Asn Asp Phe Gln Ile Ser Lys Tyr Glu Asp Glu Ile Ser Ala Glu Tyr	
340 345 350	

gac gat tca tta ata gat gaa gaa gaa gat gat gaa gac tta gac gaa 1104
 Asp Asp Ser Leu Ile Asp Glu Glu Glu Asp Asp Glu Asp Leu Asp Glu
 355 360 365
 ttt aag cct att gtg caa tat gac aat ttc caa gat gaa gaa aac ata 1152
 Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile
 370 375 380
 gga att tat aaa gaa cta gaa gat ttg ata gag aaa aat gaa aat tta 1200
 Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu
 385 390 395 400
 gat gat tta gat gaa gga ata gaa aaa tca tca gaa gaa tta tct gaa 1248
 Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu
 405 410 415
 gaa aaa ata aaa aaa gga aag aaa tat gaa aaa aca aag gat aat aat 1296
 Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn
 420 425 430
 ttt aaa cca aat gat aaa agt ttg tat gat gag cat att aaa aaa tat 1344
 Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr
 435 440 445
 aaa aat gat aag cag gtt aat aag gaa aag gaa aaa ttc ata aaa tca 1392
 Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
 450 455 460
 ttg ttt cat ata ttt gac gga gac aat gaa att tta cag atc gtg gat 1440
 Leu Phe His Ile Phe Asp Gly Asp Asn Glu Ile Leu Gln Ile Val Asp
 465 470 475 480
 gag tta tct gaa gat ata act aaa tat ttt atg aaa cta taa aag gtt 1488
 Glu Leu Ser Glu Asp Ile Thr Lys Tyr Phe Met Lys Leu
 485 490
 ata tat 1494

<210> 47

<211> 493

<212> PRT

<213> Plasmodium falciparum

<400> 47

Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 1 5 10 15

Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
 20 25 30

Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys
 35 40 45

Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 50 55 60

Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Arg	
65					70					75					80	
Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Asp	Arg	
				85					90					95		
Leu	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	
			100					105					110			
Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	
		115					120					125				
Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	
	130						135					140				
Gln	Glu	Arg	Leu	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	
145					150					155					160	
Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	
				165					170					175		
Leu	Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	
			180					185					190			
Asp	Leu	Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	
	195						200						205			
Arg	Asp	Leu	Glu	Gln	Arg	Lys	Ala	Asp	Thr	Lys	Lys	Asn	Leu	Glu	Arg	
	210					215					220					
Lys	Lys	Glu	His	Gly	Asp	Ile	Leu	Ala	Glu	Asp	Leu	Tyr	Gly	Arg	Leu	
225					230					235					240	
Glu	Ile	Pro	Ala	Ile	Glu	Leu	Pro	Ser	Glu	Asn	Glu	Arg	Gly	Tyr	Tyr	
			245						250					255		
Ile	Pro	His	Gln	Ser	Ser	Leu	Pro	Gln	Asp	Asn	Arg	Gly	Asn	Ser	Arg	
			260					265					270			
Asp	Ser	Lys	Glu	Ile	Ser	Ile	Ile	Glu	Lys	Thr	Asn	Arg	Glu	Ser	Ile	
		275					280					285				
Thr	Thr	Asn	Val	Glu	Gly	Arg	Arg	Asp	Ile	His	Lys	Gly	His	Leu	Glu	
	290					295					300					
Glu	Lys	Lys	Asp	Gly	Ser	Ile	Lys	Pro	Glu	Gln	Lys	Glu	Asp	Lys	Ser	
305					310					315				320		
Ala	Asp	Ile	Gln	Asn	His	Thr	Leu	Glu	Thr	Val	Asn	Ile	Ser	Asp	Val	
				325					330					335		
Asn	Asp	Phe	Gln	Ile	Ser	Lys	Tyr	Glu	Asp	Glu	Ile	Ser	Ala	Glu	Tyr	
			340					345					350			
Asp	Asp	Ser	Leu	Ile	Asp	Glu	Glu	Glu	Asp	Asp	Glu	Asp	Leu	Asp	Glu	
		355					360					365				

Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile
 370 375 380
 Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu
 385 390 395 400
 Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu
 405 410 415
 Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn
 420 425 430
 Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr
 435 440 445
 Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
 450 455 460
 Leu Phe His Ile Phe Asp Gly Asp Asn Glu Ile Leu Gln Ile Val Asp
 465 470 475 480
 Glu Leu Ser Glu Asp Ile Thr Lys Tyr Phe Met Lys Leu
 485 490